method was employed at Cologne in 1871.[1] A company formed in Paris for its employment had but a very brief existence,[2] probably owing to a similar discovery which soon supplanted the one described above.

This method, originated and perfected since 1867,[3] by the inventive powers of M. Tessié du Motay, employs peroxide of manganese as the carrier of oxygen, and takes its stand upon the following reactions. Sodic hydrate exposed to dark red heat with manganese and air, yields, as Mitscherlich discovered, manganate of sodium and water, $4NaOH + 2MnO_2 + 2O = 2\ Na_2MnO_4 + 2H_2O$; and manganate of sodium, under the influence of a dry current of overheated steam, disengages at the same temperature sodic hydrate, manganic sesquioxide, and free oxygen, $2Na_2MnO_4 + 2H_2O = 4NaOH + Mn_2O_3 + 3O$. By previously depriving the overheated air of its carbonic acid, one may preserve the mixture in a perpetually active state. This method has been thoroughly tested and approved, and has since been employed on a large scale in Comines, near Lille; in Pantin, near Paris; in New York, in Brussels, and in Vienna. Bothe[4] informs us that a mixture of sixty parts of dry carbonate of sodium with forty parts of 95 per cent. peroxide of manganese, when fused, contains 74·62 parts of manganate of sodium, and that 40 kilogs. of this mixture, which, according to calculation, should give 2,036 cb.m. of oxygen gas, produced in reality 1,800 cb.m., or 90 per cent. of the theoretical yield. He recommends the proceeding as a very practical one. M. Pourcel[5] has given us the most detailed description. According to him, M. Tessié du Motay employs cast-iron ellipsoidal retorts, which lie horizontally one beside the other, and are divided by a grating parallel to their axes, into two unequal parts. Over the grating 350 kilogs. of manganate of sodium, or of the reduced mixture of manganese and soda, are so spread out that its height amounts to 0·60 m., and the empty space above and below the mass is as inconsiderable as possible. In Comines, where five of these retorts are used, the amount of oxygen produced daily is 140 cb.m. at the cost of 450 kilogs. of coals for heating the retorts, and of 150 kilogs. used for the steam-engine. The air is passed through a thin iron vessel with quick-lime by means of the bellows, under a pressure of from 3 to 4 cm. of mercury, and enters the retort from above. The temperature of the latter can be observed through a hole provided with an iron stopper. In this way the air gives off only about half of its oxygen, so that to produce 1 vol. of oxygen 10 vol. of air must be passed through, the remainder escaping into the atmosphere. Five minutes suffice for oxidising the reduced mass. The current of air is then interrupted by means of a three-way stopcock and superheated steam passed through the retorts for five minutes, while the gas, passing out below the grating, enters condensers. Here a fine rain of cold water frees the oxygen from the steam, and the gas enters the gasometer under the pressure of a column of water of from 8 to 10 cm. in height. Thus reduction and oxidation alternate at intervals of five minutes. After a lapse of six hours only, it is necessary, for a perfect regeneration of the fused mass, to admit atmospheric air for about an hour, because the quantity of oxygen obtained becomes lowered after five or six hours, down to half or even a third part of the original quantity. In Vienna the cocks are worked by an automatic apparatus. The longer the steam is forced in and the retorts freed from air before the communication with the gasometer is opened, the purer will be the oxygen; half a minute is enough to leave only 15 per cent. of nitrogen mixed with it, provided the injurious space in the retort be kept as small as possible. If the nitrogen be lowered to 4 per cent., which is easily effected, the sacrifice of oxygen will be so much the greater. To make certain that the quantity of nitrogen remains within the limits of 15 and 10 per cent., which are proved to be the most practicable, gas is taken from the gasometer or the condenser in graduated tubes, and the oxygen is absorbed by means of pyrogallate of potassium, a reaction attended by quick and sure results, even in unpractised hands.

As every cooling down of the retort below dark red heat lessens the yield, care is necessary to raise the temperature of the air, as well as of the steam, to about 300° C. In Pantin, where several groups of ten retorts are set up, two of them are filled with pumice-stone to warm the air and the steam. The composition of the fused mass corresponds to 2 mol. NaOH, 1 mol. MnO_2, and the fifth part of a mol. of cupric oxide, which serves only to disintegrate the mass and make it more accessible to the influence of the air and steam. In Comines peroxide of manganese is reproduced from the residues of chlorine by the known methods, almost in a pure state. Its market-price, for which the Pantin works buy it, amounts to 2 fr. per kilog. The high price of this basis of the manufacture of oxygen is indifferent, as it can be used continuously, and the longer, the more carefully the air is kept free from carbonic acid. If, through some unavoidable interruption of the manufactory, the mass should have attracted carbonic acid from the atmosphere, it suffices to bring it to a red heat, and pass steam over it until the steam, on leaving the retorts, produces no precipitates in lime-water: then hot air passed over it will restore the mass to its original efficiency. On an average, a retort is said to last about a year.

M. Tessié du Motay's method produces a cubic metre of 90 per cent. of oxgyen for 15 to 30 centimes,[1] or, according to the results of Herr Kuppelwieser's experiments,[2] 1,000 cubic feet at 3 fr., a price in accordance with the last-mentioned sum, and scarcely exceeding that of coal-gas. We may regard this method as a final and successful solution of the problem of discovering economical and rational chemical means for obtaining oxygen.

(*To be continued.*)

NOTES

The Wollaston Medal of the Geological Society has been awarded to Prof. Huxley, and will be presented at the Anniversary of the Society on the 18th inst. Prof. Huxley has also been elected a Corresponding Member of the Danish Academy of Sciences.

The *Times* of yesterday contains a summary account of what has been done so far in this and foreign countries towards organising the Loan Collection of Scientific Instruments to be opened at South Kensington in April. The invitation from the Science and Art Department has met with a hearty response both in this country and from foreign Governments. We last week gave a list of the Foreign Committees, and the *Times* publishes the list of those on the English Committees in the various departments of Mechanics, Physics, Chemistry, Geology, and Biology; and as the *Times* remarks: "By going over them not only does one get an idea of the disinterested way in which men—for the most part busy men—have come forward to help the Department, but there can be no better guarantee of. the success of the Exhibition than that afforded by the list of those who are labouring to make it successful." It would indeed be difficult to mention any man of scientific eminence in this country whose name is not included in the list. Out of England, as our readers would see from last week's list, the most numerous committee is the German one. On this the *Times* says:—"The German list gives us much food for thought. It is known, for instance, that the thirty-four local committees, representing her many Universities, Polytechnic Schools, and other scientific centres, were all organised in a week, and that her Universities will, in all probability, be the richest contributors, whereas when we have mentioned Edinburgh, Glasgow, Manchester, Birmingham, Leeds, and Liverpool, and perhaps Newcastle, we have almost exhausted the localities where committees would be useful." The teaching side of the collection will be complete beyond all anticipation. The Physical Cabinet, it is stated, will be such as the world has never seen, towards the formation of which not only will British, French, German, Italian, and Austrian instrument makers lend their aid, but the collections of the Royal Institution, Glasgow University, Edinburgh University, King's College, the Conservatoire des Arts et Métiers, the College de France, the Universities of Berlin, Bonn, Heidelberg, Leipsic, Vienna, Rome, and Leyden, and the Tayler Institution at Haarlem, and the like, will be ransacked. The Chemical and Historical Collections will be of scarcely less magnitude. With regard to the last it is still doubtful whether Italy will part with Galileo's telescope and magnet, even for a month, though it is hoped that some of the numerous instruments left behind by Torricelli, Volta, and Galvani, may yet be obtained. Besides instruments which are sacred as having belonged to the pioneers of science, others with which the greatest investigators of modern times have made their famous discoveries will have their place in the Exhibition. The *Times* article concludes :—"The scientific position of England has been distinctly raised by this step on the part of our Government, and the Lord President is to be congratulated on a step which not only adds reputation to his Department, but promises to aid so greatly the cause of scientific instruction throughout the land."

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[1] Philipps, "Der Sauerstoff," Berlin, 1871, 22.
[2] Wagn. Jahresber., 1867, 215.
[3] Tessié du Motay, Institut 1868, 48.
[4] Bothe, Zeitschr. d. Vereins deutch. Ing., 1867, 334.
[5] Pourcel, "Mémoires de la Société des Ingénieurs Civils." Paris, 1873.

[1] Philipps, "Der Sauerstoff," 18.
[2] Kuppelwieser, Berg-u. Hütten. Zeitung, 1873, 354.

UNDER the direction of Prof. Todaro, the biological department in the University of Rome has recently been exhibiting great activity. Prof. Todaro himself has published during the last two or three years a number of important papers, including a monograph upon the development of Salpa. There has also appeared a volume entitled "Recerche nel Laboratorio de Anatomia della Universita de Roma," which contains a number of valuable contributions both by Prof. Todaro and his pupils. Considering the vigour which is being displayed by the anatomists at Rome, it is much to be regretted that the University of the capital of Italy supplies, for biological purposes, accommodation of the most meagre kind.

MR. HERBERT SPENCER has been elected a Corresponding Fellow of the Royal Academy of Rome.

THE first and second Cambridge Smith's Mathematical Prizes have been awarded respectively to Mr. J. T. Ward and Mr. W. L. Mollison, the Senior and Second Wrangler.

AT the last sitting of the Lisbon Royal Academy of Science, the members passed a resolution expressing their appreciation of Lieut. Cameron's labours in traversing the African continent from east to west. A copy of this resolution will be transmitted to Lieut. Cameron. At the same sitting Mr. Bowdler Sharp and Father Secchi were elected Corresponding Associates of the Academy.

ON Monday next, Feb. 14, Prof. Flower will commence an important course of nine Hunterian Lectures at the Royal College of Surgeons, Lincoln's Inn, to be given on Mondays, Wednesdays, and Fridays, upon "The Relation of Extinct to Existing Mammalia, with special reference to the Derivative Hypothesis." This course is a continuation of that of 1873, which we were enabled to report shortly at the time. The discoveries since that year among the *Monotremata*, *Edentata*, *and Ungulata* will be described, as well as the American extinct Perissodactylates and Arteodactylates. Among the most interesting features of the course will be the account of the extinct aberrant Ungulate, *Uintatherium*, and the quasi-proboscidians of North America, also of *Toxodon* and *Nesodon*. The fossil Sirenia, including *Halitherium* ; the Cetacea, Pinniped Carnivora, Fissiped Carnivora ; Tillodontia, Insectivora and Cheiroptera, Rodentia and Primates will also be included. The lectures will be fully illustrated by specimens from the Museum, and by diagrams. We shall have the opportunity of giving fairly full abstracts of these lectures, one each week—the first in our next issue.

M. CAZIN sends an interesting note to the last number of the *Bulletin International*. It seems that M. G. Loppé, the glacier painter, well known to all Alpine tourists, and Mr. James Eccles, of London, attempted on January 20 last the ascent of Mont Blanc. They were only able to reach the Grand Plateau ; the wind raised thick clouds of snow dust, which threatened to bury the party. Thermometric observations were made, and they show that the temperature varies little in the high Alpine regions. The lowest temperature (− 13°) observed on the Grand Plateau (3,932 metres) is no lower than the temperatures observed in the same place during summer. The provisions—meat, bread, wine, tea—were frozen, and the wind made the cold insupportable. The following are the temperatures observed during the ascent and at Chamounix :—

ON THE MOUNTAIN.

Jan.	19.	Junction of the glaciers,	2,600	metres,	4.30 P.M.	− 5°·5
,,	,,	Grand Mulets ...	3,050	,,	8.30 ,,	− 7
,,	20	,, ,, ...	,,	,,	2 A.M.	− 7
,,	,,	Small Plateau ...	3,635	,,	8.30 ,,	− 12 ·5
,,	,,	Grand Plateau ...	3,932	,,	9.30 ,,	− 13
,,	,,	Grand Mulets ...	3,050	,,	1 P.M.	− 8 ·5

At Chamounix the temperature on Jan. 20 at 7 A.M. was − 11°, at 8 A.M. − 10°, at 10 A.M. − 9°, at 11 A.M. − 8°. The sun began to appear at 11.30.

AT a meeting of the Edinburgh Medico-Chirurgical Society, held on Monday, Jan. 31, Dr. Matthews Duncan read a paper on the alleged epidemic character of erysipelas and puerperal fever. From an elaborate set of diagrams showing the weekly and yearly deaths registered in London from 1848 to 1875, it was pointed out that during the whole of this time erysipelas and puerperal fever have on no occasion exhibited any approach in their death-rate to such diseases as cholera, small-pox, and scarlet-fever, allowed by all to be epidemic in their character, but that the weekly and annual fluctuations in their death-rate are practically identical with those of rheumatism. It was therefore concluded that erysipelas and puerperal fever should be classed not as epidemic but as endemic diseases.

PROF. E. QUETELET has published the climatological elements of Brussels in a series of eighteen tables, with descriptive letter-press, for the ten years ending 1873, as part of a public statistical document of Brussels relative to this ten-year period, and which has been printed with the title "Statistique générale de la Ville de Bruxelles."

IN a circular letter addressed to the Presidents of the Departmental Meteorological Commissions, dated January 29, M. Leverrier points out that, in developing the system of weather-forecasts for agriculturists, attention must be paid not only to the quantity of rain which falls, but also to the way in which the fall is propagated from canton to canton and from department to department. The manner of propagation of the rainfall it is proposed to represent by means of curves, and the Commission are requested to assist in the work so as to render it possible to construct such charts for the whole of France, and in consideration of the immense labour of the undertaking, skilled meteorologists are invited to lend their assistance in the preparation of these novel but highly-important charts. Still greater precision in stating the local circumstances connected with remarkable hail-storms is insisted on, particularly when it is considered that though everyone knows hail to fall in very different quantities in districts immediately contiguous to each other, and individual cantons and communes to be notorious for their destructive hail-storms, yet the influence of woods, forests, river-courses, and hills is a question still unsolved. This conception of Leverrier's with reference to the vitally important bearing on the meteorology of a country of a comprehensive observation of the rainfall, hail, and thunderstorms, by numerous observers possessing sound local information, is not merely eminently just in science, but augurs well for a satisfactory solution of the peculiarly important but difficult problem he has taken in hand.

THE "Annuaire météorologique et agricole de l'Observatoire de Montsouris pour l'An 1876" (pp. 442) has just appeared, containing a good many matters not included in previous issues, of which the most interesting are a chart showing the lines of equal magnetic declination for France and parts of the countries adjoining, a table showing the successive values of the declination from 1550 to 1875, a chapter on atmospheric electricity, a table giving the mean temperature of Paris for each day of the year, calculated from sixty years' observations, a comparison of the mean hourly observations from March to September, between the thermometer in shade and Becquerel's electric thermometer, fixed at a height of sixty-five feet above the ground; and a variety of tables, partly chemical and partly meteorological, bearing on agriculture.

Dr. E. Perceval Wright, M.A., F.L.S., was, on the 5th inst., re-elected Professor of Botany and Keeper of the Herbarium in the University of Dublin.

The Royal Irish Academy has lately shown a large amount of literary life. Its publications consist, like those of most of our chartered societies, of Transactions and Proceedings. Of the Academy Transactions during the last twelve months twelve parts have been published; it is noteworthy that these parts, each containing a single memoir, have been published within a few weeks after they have been read. Among them we notice Mr. Jellet's memoir on Chemical Optics, Mr. Stoney's report on Riveted Joints, Dr. Macalister's report on the Anatomy of Insectivorous Edentates, Mr. Baker's report on the Seychelles Fern Flora, Dr. Doberck's four memoirs on various Binary Stars, and on the first Comet of 1845, Dr. Hart's memoir on the Nine-point Contact of Cubic Curves, Mr. Mackintosh on Echini Spines, and Prof. King on Jointing. The Scientific Proceedings during the same period have been published quarterly, and the four parts contain thirty-seven memoirs, not of sufficient importance for the Transactions, which are illustrated by thirty-four plates and many woodcuts. One long report by Rev. E. O'Meara on Irish Diatomaceæ will be of interest to all microscopists, while many of the papers by Dr. Macalister, Mr. Archer, Mr. Mackintosh, Mr. Burton, Dr. McNab, Dr. Leith Adams, are of very considerable importance. Speedy publication is the very life of science, and we trust the Irish Academy will indulge, in this respect, in a generous rivalry with the cognate London societies. The separate publication of the memoirs is a boon to the working student, who cannot always afford to buy a large volume of some 600 pages for the sake of perhaps one small memoir.

The Royal Commissioners on Vivisection have signed their report, which will forthwith be despatched to her Majesty.

M. Berthelot, the celebrated chemist, is a candidate in the moderate Republican interest for the representation in the French Chamber of Deputies, of the district in which the Institute is situated.

With this month's number of Petermann's *Mittheilungen* is a map of the African west coast from 3° to 6° S. lat., showing the results obtained by the German African Expedition. A short paper by Dr. Güssfeldt states briefly the bases on which the map is constructed. Its special value lies in the fact that it is almost wholly constructed from materials obtained by the personal observation of Dr. Güssfeldt. The same number contains the continuation of the account of the recent Paris Geographical Exhibition. Dr. A. Schreiber, who lived six years in Sumatra, contributes an important paper on the Southern Batta Lands of that island; the paper is accompanied by an excellent and full map of that portion of the island between the equator and $2\frac{1}{2}°$ N. lat., and westward of the 100th degree of E. long. The number contains what may be regarded as a complete geographical necrology for 1875. It comprises thirty-six names, and how wide Dr. Petermann's interpretation of the word geography is may be learned from the fact that among these names are those of Sir Charles Lyell, Sir W. E. Logan, and Dr. von Willemoes-Suhm. The number concludes with the continuation of Dr. Conto de Magelhaes' account of his travels in Uruguay.

The *Geographical Magazine* for February contains a brief but clear account of the work accomplished by Cameron. Major Wood's paper on former physical aspects of the Caspian is continued, and Prof. Giglioli contributes translations of letters from Dr. Beccari, the Italian explorer of New Guinea; a map accompanies these letters.

The December number of the *Bulletin* of the French Geographical Society contains the abstract of the diary of a Rabbi who recently journeyed from Mogador in Morocco to the Djebel Tabayoudt. The Abbé Durand's valuable paper on the basin of the Madeira, S. America, is concluded, and M. Fournier contributes some recent information on Mozambique and the production of the basin of the Zambesi. M. V. A. Malte-Brun reports on Dr. Van Raemdonck's work on the terrestrial and celestial spheres of Mercator. In connection with the proposed erection of a Central Meteorological Observatory on Mont Pie, Abbé Perrier gives some account of that mountain. It is in the middle of the Graian Alps, 3,593 metres above the sea, nine kilometres from the town of Aosta.

Among the notices of motion in the House of Commons on the opening day of Parliament, were one by Sir John Lubbock to introduce his National Monuments' Bill, and another by Mr. Mundella of a Bill for the establishment of Free Libraries, Museums, and Institutions for the Teaching of Science and Art.

The French Association for the Advancement of Science opens its next Congress at Clermont-Ferrand on August 17 next.

Vol. V. Part II. of the *Natural History Transactions of Northumberland and Durham* contains the Presidential Addresses for 1874 and 1875. The most important contribution to the part is an interesting Memoir of the Life of the late Albany Hancock, by Dr. Embleton, which ought to prove acceptable to all naturalists. A beautifully-executed steel portrait accompanies the memoir, and appended is a list of seventy-three works, mostly contributions to various journals, written either wholly by Mr. Hancock, or in conjunction with some one else. Dr. Embleton also contributes a paper on the Vendace (*Coregonus Willoughbii*, Yarrell, *C. Marænula*, Jardine and Jenyns), and Mr. G. C. Atkinson a second instalment of a Catalogue of the more remarkable Trees of Northumberland and Durham.

Another catastrophe has befallen the Island of Réunion. On Dec. 22, 1875, a terrific cyclone, accompanied by a thunderstorm, deluged St. Denis, the chief town. The whole island, fifty miles long, by thirty miles broad, was more or less damaged; but the loss of life has been smaller than when the landslip occurred a month previously.

We have received a copy of the first number of *The American Journal of Microscopy*, a new monthly paper published at New York, which has commenced in an unpretentious manner, the object of the editor evidently being to increase it if he finds that the plan of its construction suits it to the wants of a sufficiently large circle of contributors.

At the last meeting of the Eastbourne Natural History Society, Dr. Ogier Ward read a paper on the Hill-Forts of Sussex.

The additions to the Zoological Society's Gardens during the past week include a Panda (*Ælurus fulgens*) from Nepal, deposited; a Hobby (*Hypotriorchis subbuteo*), and a Common Kestrel (*Tinnunulus alaudarius*), captured in the Red Sea, presented by Mr. S. Baton; a Bonnet Monkey (*Macacus radiatus*) from India, presented by Mr. E. Darwell; two Snowy Egrets (*Ardea candidissima*) from America, purchased; a Red-crested Cardinal (*Paroaria cucullata*) from S. America; two Amaduvade Finches (*Estrelda amadava*) from India, presented by Mr. Peter W. Barlow, jun.; a Swainson's Lorikeet (*Trichoglossus swainsoni*) from Australia, presented by Mrs. G. F. Angas.